

Christopher Cantalupo

Profile

Creative and resourceful problem solver with ten years of experience designing and debugging software for high performance computing. Effective communicator who has explained technical problems clearly for eight years in an international collaboration of hundreds of scientists and engineers working together for the success of a billion dollar satellite mission. A solid background in math and statistics has provided the foundation for the work and is evidenced by a long record of publishing statistical analysis of scientific data in refereed journals.

Education

Sep 1996–
May 2000 **Carnegie Mellon University, Pittsburgh**, Bachelor of Science.
Mathematics, minor in physics; graduated with College Honors

Full Time Work Experience

Jan 2005–
present **Lawrence Berkeley National Lab, Berkeley**, Computer Systems Engineer.
Developed software for analyzing time series data collected by ESA's Planck satellite microwave telescope under a NASA grant while working in the Computational Cosmology Center and using the DoE's NERSC supercomputing center.
Designed and developed the MADmap application in C which performs a Bayesian statistical analysis of time series data collected by microwave telescopes to produce images of the sky and samples from the noise distribution. MADmap uses a hybrid OpenMP/MPI parallel model, runs on distributed computing resources, and has been scaled to over 100,000 compute cores.
Designed and developed the M3 microwave telescope data access library in C which is an XML document based data description paired with API for analysis applications which abstracts the way the data is produced.
Designed and developed ccSHT a C library to perform massively parallel spherical harmonic transform.
Assisted in teaching a large international scientific collaboration to exploit the parallel computing resources available at NERSC.
Simulated and analyzed data collected by microwave telescopes.

Sep 2001–
Jan 2005 **U.C. Berkeley Space Sciences Lab, Berkeley**, Programmer/Analyst.
Guest at Lawrence Berkeley National Lab, but employed by the University of California. LBNL position was a continuation of the work which was begun during the tenure of the U.C. position and is described above.

Jun 2000–
Aug 2001 **Carnegie Mellon University Physics Department, Pittsburgh**, Research Associate.
Developed software package in MATLAB and C to perform data analysis for the the Viper telescope.
Analyzed the Sunyaev-Zeldovich observations taken by the Viper telescope during this period.
Traveled to South Pole site to prepare the Viper telescope for winter observing.

Jun 1997–
Jan 1998 **Carnegie Mellon University Physics Department, Pittsburgh**, Research Assistant.
Designed mechanical parts for the Viper telescope.
Retrofitted and maintained existing cryogenic receiver for use on the Viper telescope.
Assembled and installed the two meter Viper telescope at South Pole site.

Awards

NASA Group Achievement Award, 2010
National Antarctic Service Award, 2000

NASA Public Service Group Achievement Award, 2010
CMU Summer Undergraduate Research Fellowship, 1998 and 1999

Computer skills

Programming Languages	C/C++, MATLAB, Maple, Fortran, UNIX shell scripting, knowledge of Perl and Python	Operating Systems	UNIX, Linux, Mac OS X, Windows
Libraries	MPI, OpenMP, libxml2, MySQL, ACML, MKL, NAG, FFTW, ScaLAPACK, LAPACK, PBLAS, BLAS, doxygen	Applications	MATLAB, Maple, gdb, ddt, totalview, dbx, pdbx, SVN, Git, CVS

Selected Publications

- Sudarsan et al, "Cosmic Microwave Background Map-Making at the Petascale and Beyond", *International Conference on Supercomputing*, paper accepted and in press, 2011.
- Cantalupo et al, "MADmap: A Massively Parallel Maximum Likelihood Cosmic Microwave Background Map-maker", *The Astrophysical Journal Supplement*, Vol. 187, Issue 1, 2010.
- Keskitalo et al, "Residual noise covariance for Planck low-resolution data analysis", *Astronomy and Astrophysics*, Vol. 522, 2010.
- Ashdown et al, "Making maps from Planck LFI 30 GHz data with asymmetric beams and cooler noise", *Astronomy and Astrophysics*, Vol. 493, Issue 2, 2009.
- Ashdown et al, "Making maps from Planck LFI 30 GHz data", *Astronomy and Astrophysics*, Vol. 471, Issue 1, 2007.
- Ashdown et al, "Making sky maps from Planck data", *Astronomy and Astrophysics*, Vol. 467, Issue 2, 2007.
- Poutanen et al, "Comparison of map-making algorithms for CMB experiments", *Astronomy and Astrophysics*, Vol 449, 2006.
- Kuo et al, "High-Resolution Observations of the Cosmic Microwave Background Power Spectrum with ACBAR", *The Astrophysical Journal*, Vol. 600, Issue 1, 2004.
- Runyan et al, "First results from the arcminute cosmology bolometer array receiver", *New Astronomy Reviews*, Vol. 47, 2003.
- Goldstein et al, "Estimates of Cosmological Parameters Using the Cosmic Microwave Background Angular Power Spectrum of ACBAR", *The Astrophysical Journal*, Vol. 599, 2003.
- Peterson et al, "First Results from Viper: Detection of Small-scale Anisotropy at 40 GHz", *The Astrophysical Journal*, Vol. 532, 2000.